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SEASON 1952-53

NYASALAND

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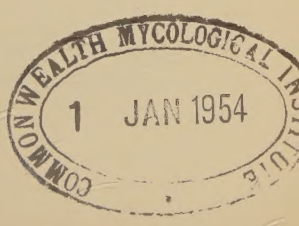

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NYASALAND

COTTON EXPERIMENT STATION
PROGRESS REPORT FOR THE SEASON 1952-53

BY

H. C. DUCKER AND R. SMITH.

Mr. R. Smith was transferred to Nyasaland as assistant plant breeder in September 1952.

District	*Elevation feet a.s.l.*	*Type of Crop*	*Months in which*		*Legal Close Seasons*
			Sown	*Harvested*	
Southern and Central Provinces	Approx. 200-2500	Summer	Dec.-Jan.	June-July	Aug.-Nov.
Northern Province	1600	Winter	May-June	Nov.-Dec.	Jan.-April

Introductory Note.

In general, planting conditions were somewhat unsatisfactory, though certain parts of the Southern Province were favoured with good early rains. The Chitala area of the Central Province, wherein this station is situated, was particularly unfortunate and has suffered drought conditions comparable with those of 1948-49. In addition, for reasons at present imperfectly understood, the Chitala area suffered from a very heavy infestation of red bollworm, *Diparopsis castanea* Hmps., which resulted in excessive losses of buds, flowers and bolls. The station crops had to be planted very late in December owing to the non-arrival of suitable rains, and the combination of circumstances resulted in the second lowest yield of cotton per acre to date. The enforcement of close season measures in 1952 was most efficient and the conclusion must be reached that July 31st uprooting does not always operate as an effective control of the major Nyasaland cotton pest at the middle and higher elevations. Reports in support of this have been received from Gatooma, Southern Rhodesia. The success of the summer crop régime reported last year is, therefore, in doubt, and the position needs to be reviewed.

In the Lower River, on the other hand, the success of 1952 was repeated in 1953 with yields per unit area fully as high as those achieved last year, though damage by stainers, *Dysdercus spp.,* was greater. These pests invaded the cotton crop earlier than is usual, and it is thought that seasonal fluctuations in the fruiting of their wild host plants may have been responsible. Reports of serious damage due to anthracnose, *Glomerella gossypii,* were not substantiated, the overwhelming proportion of the staining being due to *Nematospora spp.* transmitted by the stainers.

The Northern Province had a good year in 1952, but poor flooding due to the partial drought has resulted in a drop of acreage for 1953.

The results of the Egyptian type cotton trials in 1952 were disappointing, and though they have been repeated in 1953 it is not thought that these cottons can compete with Uplands as a winter crop in Nyasaland. The figures for Karonga (North Nyasa) and Nchalo (Lower River) trials are summarised in Table 1.

TABLE 1.
YIELDS IN LB. SEED COTTON PER ACRE.

	Karonga	*% CLB*	*Nchalo*	*% CLB*
BAR 4/16	242	13	339	24
XL1	252	14	358	26
BLR 14/25	338	18	360	26
Domains Sakel	190	10	378	27
X1730A	298	17	366	26
BP 52	850	47	—	—
CLB Local	1800	100	1386	100
Sig. Diff. (P=0·05)	158	9	136	10
S.E.	57·0		49·1	

The superior yielding power of the Uplands is sufficiently obvious, but the figures do not show their greater storm-proofness, a most marked characteristic. The Egyptians all shed seed cotton freely in any wind.

Rainfall at the Cotton Experiment Station was as follows: —

Inches.

1952			1953						
Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
0·08	3·24	2·41	8·21	6·64	3·87	—	—	—	—

The total of 24·45″ was nearly 10″ below the 20-year average, and the actual start to the planting season was about the latest on record. The mid November rainfall was useless to crops since it was followed by a long and severe spell of hot dry weather not broken until 28th December.

Though good yields were obtained with maize and the earlier varieties of sorghum, groundnuts gave patchy returns and cotton, at 190 lb. seed cotton per acre, yielded less than one-third of the 1952 crop. Fortunately, other parts of the Central Areas were more favoured with rain, and intensive bollworm damage proved less widespread than was at first feared. The total Nyasaland crop is expected to reach 16,000 bales, an increase of 28% on the 1952 total. The improvement initiated that year is therefore continuing.

MECHANISATION.

The tractor disc-ridger referred to in 1952 did very good work and is a definite improvement on the mouldboard type previously used. It is thought, however, that it is capable of improvement, and experiments

are being planned in co-operation with its makers, a Southern Rhodesian firm, which will be carried out at the station.

Provision has been made for more machinery and implements, and a threshing machine of Australian manufacture has been bought. This has done very well with maize and sorghum, and can be adapted to beans. The purchase of a second tractor and certain ploughs and cultivators is under consideration at the time of writing this report.

Cotton.

In spite of poor bulk yields a not unsatisfactory programme of work has been completed.

The CL20 sub-strains were compared in a full scale trial, repeated with the assistance of the Department of Agriculture at their Lower River station, Makanga. The lint of high-yielding strains from both trials has been sent to the Shirley Institute for further testing and the strains retained will be incorporated in a new filter bulk.

The 1951-52 filter bulk of CL20 was further multiplied, and seed surplus to the needs of the station has been handed to the Nyasaland Farming Corporation. CL20 grown by this organisation in 1953 yielded well, and some 80 bales (400 lb. nett) are available for export.

A special sample of CL20 lint from the station, comprising 50 lb. roller ginned and 50 lb. saw-ginned, has gone to Lancashire for a mill test. The Ngabu filter bulk of CLB cotton was multiplied in isolation and sufficient seed produced for all purposes in 1953-54. This lot should show an improvement in ginning outturn compared with its parent stock, the present commercial cotton, but its lint quality should be about the same.

A series of varietal trials to compare CLB, CL20 and leading East African varieties was laid down in co-operation with the Department of Agriculture, officers of which cared for all outside experiments. Results are shown in Table 2.

Table 2.

Yields in Lb. Seed Cotton per Acre.

	Chitala	*Tuchila*	*Kakoma*	*Ngabu*	*Makanga*	*Misange*	*General Means*
CLB	385	530	851	645	1240	857	751
CL20	542	675	1022	829	1218	734	837
Uk48	410	552	802	—	1225	—	747
Uk51	367	515	910	690	1240	—	744
S47	358	525	923	650	1046	661	694
BP52	380	449	878	632	949	—	658
Sig. Diff. P = 0·05	52	78	82	124	187	115	
S.E.	18·8	28·2	29·6	44·8	65·1	41·5	

Seed weights and consequently ginning outturns were very variable from site to site, owing to fluctuations in stainer damage. Tuchila was the worst affected with over 53% stained cotton, mainly by stainer-carried *Nematospora spp.*

Lint samples from the Chitala Cotton Experiment Station and Makanga Department of Agriculture trials, of all but the two Uganda varieties, have been sent to the Shirley Institute for large scale testing.

CL20 has proved to be at least as good a yielder as its parent CLB, while neither of the Tanganyikan cottons surpasses them. The Uganda cottons seem less well suited to Nyasaland summer crop conditions, and a definite decision has been made to discard S47. BP52 still offers possibilities as a parent stock in new crosses.

The simple fertiliser experiment comparing two levels of nitrogen was repeated, but showed no treatment effects this year. Dry conditions and poor yields owing to excessive bollworm were presumably responsible. In the first year following the application of fertilisers to maize, however, a significant residual effect of phosphorus was recorded on the CL20 cotton bulk planted in the previous experimental area. The results are shown in Table 3.

Table 3.

Yields in Lb. Seed Cotton per Acre (1953).

	N	*P*	*K*	
0	325	263	321	Sig. Diff. P=0·05
1	317	351	315	34 lb.
2	332	360	338	S.E. 12·3

Applications (1952).
0 = Nil.
1 = 100 lb. Ammonium Sulphate (N) or 200 lb. of a commercial mixture of rock superphosphate (P) or 25 lb. KCl (K).
2 = Double amounts shown in 1.

Bacterial Blight.

The incidence of this disease was generally light on the station, only the angular leafspot and stem lesion phases being commonly observed. The plants showing most infection were on the heavier soil, and these grew away from the disease later as the rains ceased. Elsewhere in the country, though not in the Lower River, bacterial blight was reported to be doing damage, but no statistical evidence has been advanced.

Seed dusting with 'Perenox' was the subject of experiment at the station and on outside plots run by the Department of Agriculture. Table 4 shows the results.

TABLE 4.

YIELDS IN LB. SEED COTTON PER ACRE.

	Chitala	*Tuchila*	*Ngabu*	*Makanga*	*General Mean*
CLB plain	305	435	641	1008	597
CLB Perenox.	346	430	515	754	509
Sig. Diff. P=0·05	52	78	124	187	
S.E.	18·8	28·2	44·8	65·1	

The results were complicated by rather irregular stands in the Lower River experiments, but do not suggest any immediate advantage from the dusting treatment. The experiments will be repeated on a larger scale next season.

The Government Pathologist made isolations of *X. malvacearum* last year and cultures from these were tested in the field. None appeared to be pathogenic, as neither seed immersion in culture suspensions nor needle inoculation tests (Wickens) produced any symptoms of the disease.

Of the parent material for resistance, first grown this year, Stoneville 20 × Albar 49 suffered severely from jassid damage. The Albar 51 strains germinated very badly and suffered much from bollworm. The crosses, Albar 49 × CL20 and Albar 49 × BP52 × CL20 were grown in their third year of 'panmixis'. They were rogued for jassid susceptibility and, so far as was possible, for bacterial blight attack, infected plants being removed from the plots. "Rubbish" such as segregates showing no lint and other freaks were also eliminated and full fuzz bulks are being kept for further study.

RED BOLLWORM (*Diparopsis castanea* Hmps.).

As the early sown, summer crop, régime is well established in all cotton growing areas of the Central and Southern Provinces, an attempt was made to observe the development of the crop in relation to the surviving infestation of red bollworm. Bulk CLB was sampled at Chitala and Makanga.

The accumulation of bolls per plant per week and the accumulation of bolls damaged by red bollworm, also per plant per week, were counted for 200 plants (samples of 10) at Makanga and for 240 plants (samples of 10) at Chitala. The results showed the differences in red bollworm attack at the two sites and indicated the development of the heavy infestation at Chitala (Fig. 1). At Makanga (Fig. 2) the crop had formed the

FIG. 1. CHITALA

(PLANTED 28th DECEMBER 1952)

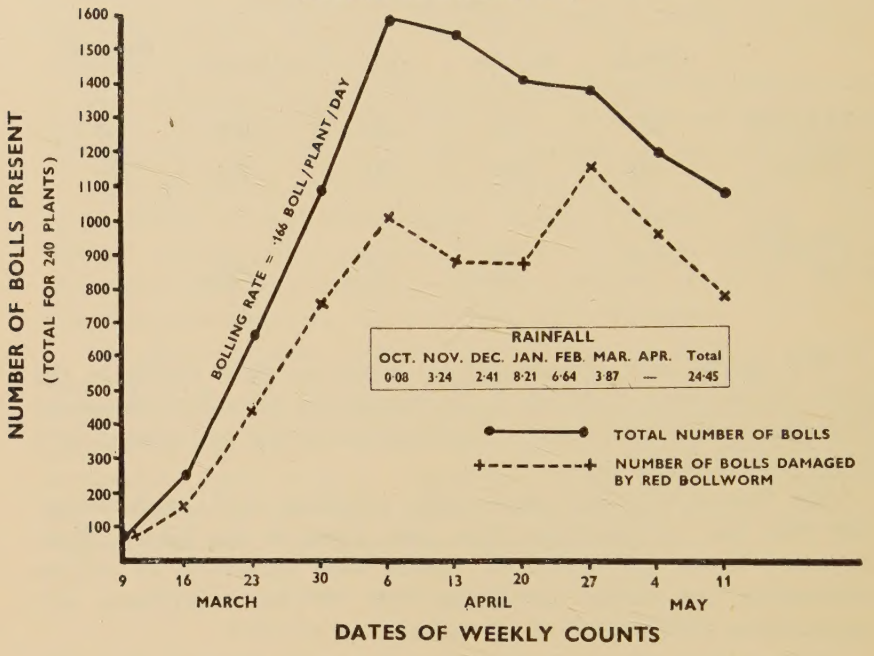
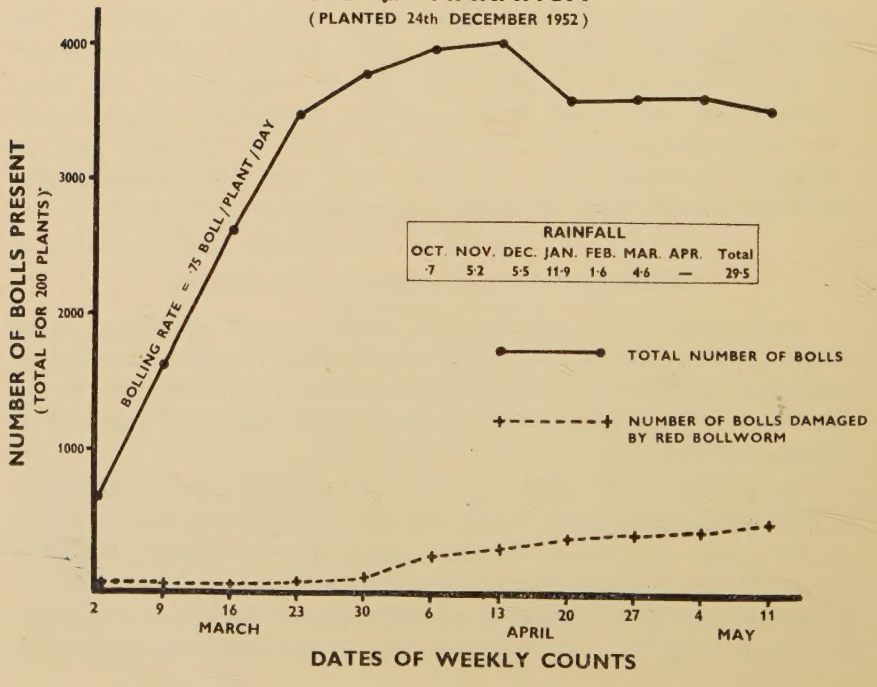


FIG. 2. MAKANGA

(PLANTED 24th DECEMBER 1952)


NUMBER OF BOLLS PRESENT
(TOTAL FOR 200 PLANTS)
4000
3000
2000
1000
BOLLING RATE = ·75 BOLL/PLANT/DAY
RAINFALL
OCT. NOV. DEC. JAN. FEB. MAR. APR. Total
·7 5·2 5·5 11·9 1·6 4·6 — 29·5
TOTAL NUMBER OF BOLLS
NUMBER OF BOLLS DAMAGED BY RED BOLLWORM
2 9 16 23 30 6 13 20 27 4 11
MARCH APRIL MAY
DATES OF WEEKLY COUNTS

majority of its bolls before red bollworm entered the fields to any extent early in April, the final figures for damaged bolls being only 14%. At Chitala, red bollworm was consuming the developing flower buds as early as 14th February, causing heavy loss of forms and damage to the majority of the bolls remaining on the plants. This continued until the first week in April, when very few further bolls could be made owing to the abrupt cessation of the rains, and developing aridity. No more red bollworm damage occurred until the end of April, simply for lack of plant material. Harvesting was started on 13th May, plants being picked fortnightly till 13th June; of the bolls picked 70% were damaged by bollworm, 17% by stainer-carried disease and only 13% were clean and white. The final yield from the bulk fields of CLB at Chitala was only 101 lb. seed cotton per acre, while at Makanga it was nearly ten times as large.

It appears from this data that the date of entry and intensity of the red bollworm attack on cotton varies considerably with local conditions under the early sown régime. The problems are mainly if not entirely entomological.

This high bollworm damage recorded at Chitala may be due to the cumulative effects of: —

(a) High bollworm population, due to a heavy carry-over of pupae from 1952 in the station lands.
(b) A reduction owing to the drought in commercial cotton plantings in the immediate area of the station, so leading to immigrations by moths bred elsewhere.
(c) Red bollworm destruction of early flower buds, causing a reduction in the number of bolls formed during the critical fruiting period.
(d) Relatively dry conditions causing slow or lessened flower production, thus upsetting the pest/food ratio.

Heavy red bollworm infestation may also depend on differences in planting dates of gardens owing to localised planting rains. In early-planted fields flowering occurs earlier, especially where the crop is well-cultivated, than in the main sowings, and would attract a majority of emerging moths. To what extent each of the possible factors is responsible at Chitala this year, it is not possible to estimate. The infestation may be due to a number of the factors combining fortuitously.

At Makanga, with the different seasonal conditions of the Lower River, especially rather better rains, the crop did not lose its early forms and so produced a greater number of bolls more rapidly. Red bollworm infestation occurred only after the majority of the bolls were well advanced to maturity, and damage was slight. The portion of red bollworm damaged bolls to clean bolls was very slight, and reflected in a yield of approximately 1,000 lb. seed cotton per acre.

Rotation Crops.

Cotton at Chitala is grown as one crop in an agricultural system balanced so far as is possible to suit local conditions and needs, the other main crops being maize, sorghum and groundnuts.

Maize.—The local mass selected native maize used as the main Chitala bulk yielded 1,800 lb. grain per acre from 30 acres sown. A large number of single plant selections made in 1952 were sown in single plots in a compact block. They yielded at a far higher rate than their parent stock and have been re-selected for good keeping qualities and high shelling percentage. They will form a new mass-selected bulk in 1954. As in 1951 and 1952, a variety trial and a fertiliser trial were carried out in co-operation with the Department of Agriculture. Hybrid maize again did well, and in the fertiliser trial a response to nitrogen was noted.

Sorghum.—This crop was confined to large observational blocks of white seeded varieties. Six early, six medium, and twelve late maturing types were sown. The latter were at a disadvantage in the very short growing season experienced this year, but excellent yields of up to 2,000 lb. grain per acre were obtained with the medium-early varieties, and four out of the six early types yielded 1,700-1,800 lb. grain per acre.

Groundnuts.—In co-operation with the Department of Agriculture, lattice square trials of the 49 leading varieties in the station collection were carried out at Chitala and on three outside sites. The combined results have been analysed and 25 of the best, including ten late types, marked for retrial in 1954.

The collection of varieties was maintained in small bulk as in previous years.

A peculiar sport was discovered in one variety, having seeds with an ivory-white testa. Nothing like this has been seen previously in Nyasaland though the Assistant Director of Agriculture states that similar sports have been found in Uganda. The new white-seed nut was multiplied and the bulk handed to the Government agricultural research station at Lilongwe. It is thought that it may be of interest to manufacturers of protein synthetic fibres.

Husbandry.

The plots of the long term rotation experiment were sown to a test crop of Gambia bunch groundnuts. Yields were at the same level as those of the same variety in the lattice trial, and there were no treatment differences. This suggests that the mineral status of the plots has not been affected by the treatments, and that the maize effects reported last year were due to nitrogen deficiencies.

Tsetse fly having apparently retreated from the whole Chitala area, the Department of Veterinary Services has initiated an experiment in

cattle keeping at Chitala. The old buildings used for the previous experiment have been reconditioned, and a small herd led by a bull, of native Zebu stock, supplied by the D.V.S. There are nine cows in all, and to date seven have calved. One produced twins. All seem very well at the time of writing, four months after the experiment was begun. If the fly remains absent, and cattle keeping in the S.W. littoral should flourish, it will have a marked effect on the local agricultural economy. Already there is some indication that grazing may render the resting areas of the station more amenable, and easier to control.

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